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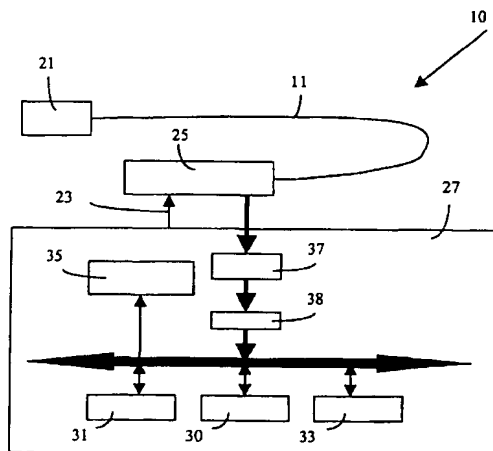
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[Continued on next page]

(54) Title: METHOD, SYSTEM AND DEVICE FOR MEASURING THE POLARISATION MODE DISPERSION OF AN OPTICAL FIBRE



(57) Abstract: The present invention relates to a new model for interpreting interferometric measurements, able to lead to a new method, system (10) and device (27) for measuring the PMD (Polarisation Mode Dispersion) of an optical fibre (11). The model, which is based on the theory of propagation of the optical signal as can be determined according to the so-called Principal States of Polarisation (PSPs) of the fibre, leads to a new interpretation of the interferogram generated with the interferometric measurements and is characterised in that it identifies in said interferogram a central peak and two side lobes. Thanks to this new model, it is possible to determine the PMD of the fibre based on the information content associated to at least one of the two side lobes identified in the interferogram.

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**Declarations under Rule 4.17:**

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS,

JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

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Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 712 704 A (P. MARTIN ET AL.) 27 January 1998 (1998-01-27) the whole document	1,6,7,10
A	US 5 852 496 A (N. GISIN ET AL.) 22 December 1998 (1998-12-22) the whole document	1,6,7,10
A	US 4 556 314 A (J. STONE) 3 December 1985 (1985-12-03) the whole document	1,6,7,10
A	US 6 271 922 B1 (H. BÜLOW ET AL.) 7 August 2001 (2001-08-07) the whole document	1,6,7,10

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 96 36859 A (T.L. VROOTS) 21 November 1996 (1996-11-21) the whole document	1,6,7,10
A	US 6 204 924 B1 (N. CYR) 20 March 2001 (2001-03-20) the whole document	1,6,7,10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5712704	A	27-01-1998	FR 2738634 A1	14-03-1997
US 5852496	A	22-12-1998	FR 2745082 A1	22-08-1997
			GB 2310281 A , 8	20-08-1997
US 4556314	A	03-12-1985	NONE	
US 6271922	B1	07-08-2001	DE 19827638 A1	23-12-1999
			EP 0965830 A2	22-12-1999
			JP 2000009592 A	14-01-2000
WO 9636859	A	21-11-1996	US 5654793 A	05-08-1997
			AU 6022896 A	29-11-1996
			CA 2219286 A1	21-11-1996
			CN 1196793 A	21-10-1998
			JP 2000510573 T	15-08-2000
			WO 9636859 A1	21-11-1996
US 6204924	B1	20-03-2001	NONE	